SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Lake Henry, Kingsbury County
2102-F-21-R-48
2015

Figure 1. Lake Henry, Kingsbury County

Legal Description: T110-R56- Sec. 13, 18, 19, 24
Location from nearest town: 4 miles south, 2-1/2 miles east of DeSmet, SD

Surface Area: 2,323 acres
Meandered (Y/N): Yes
OHWM elevation: no data
Outlet elevation: no data
Max. depth at outlet elevation: 8 feet
Observed water level: 3 feet low
Contour map available (Y/N): no

Watershed area: no data
Shoreline length: no data
Date set: NA
Date set: NA
Mean depth: 4 feet
Volume at outlet elevation: 14,440 acre feet
Date mapped: NA

DENR beneficial use classifications: (6) warmwater marginal fish life propagation, (8) limited-contact recreation and (9) wildlife propagation and stock watering

Introduction

General

Lake Henry was named in honor of George Henry, a pioneer resident of the area.

Ownership of Lake and Adjacent Lakeshore Properties

Lake Henry is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes and the South Dakota Department of Game, Fish and Parks (GFP) manages the fishery. Portions of the shoreline lie within Waterfowl Production Areas owned by the United States Fish and Wildlife Service (USFWS). The remainder of the shoreline is privately owned.

Fishing Access

The Lake Henry Access Area on the south shore of the lake contains a single lane boat ramp, boat dock, parking lot, and concrete vault toilet. Shore fishing is available within the access area and on the public lands described above.

Water Quality and Aquatic Vegetation

Water temperature during the survey was 22^{o}C (74^{o}F) and water clarity was 64 cm (25 in) (Table 1). Small beds of sago pondweed were observed. In general, more vegetation is observed when water clarity is better.

Table 1. Water temperature, Secchi depth and observations/comments on water quality and aquatic vegetation in Lake Henry, Kingsbury County, 2006-2015.

Year	*Water Temp ^{o}C (^{o}F)*	*Secchi Depth cm (in)*	*Observations/Comments (algae, aquatic vegetation, water quality, etc.)*
2015	22 (72)	64 (25)	Sago pondweed
2014	24 (74)	69 (27)	Some sago pondweed
2012	26 (79)	46 (18)	No vegetation observed
2010	27 (80)	107 (42)	Some sago pondweed
2008	26 (79)	62 (24)	Lots of sago pondweed

Fish Community

The fish community in Lake Henry is typical of large, shallow natural lakes in eastern South Dakota (Table 2.). Fish movement from Lake Thompson has some influence on the species found in Lake Henry. For example, the white bass and black crappie found in Henry likely originated from Lake Thompson.

Table 2. Fish species commonly found in Lake Henry, Kingsbury County.

Game Species	***Other Species***
Walleye	Common Carp
Yellow Perch	White Sucker
Northern Pike	Bigmouth Buffalo
Black Crappie	
Black Bullhead	
White Bass	

Fish Management

Lake Henry is shallow and prone to water level fluctuations that limit fisheries management and recreational boating opportunities, sometimes for several consecutive years. The lake is managed for walleye and yellow perch and good northern pike fisheries are often naturally-produced when terrestrial vegetation is flooded. Walleye abundance is maintained by fry stockings (Table 4).

Several fish kills have been recorded on Lake Henry since 2001 (Table 3). Other fish kills likely occurred during periods of time the lake was not managed due to extremely low water levels.

Table 3. Fish kill history for Lake Henry, Kingsbury County.

Year	***Severity***	***Comments***
2001	Light	Dead fish in waterway between Henry and Thompson reported.
2007	Light	Winterkill - live COC, WHS, NOP sampled
2008	Moderate	Winterkill - multiple species found alive

Table 4. Stocking history for Lake Henry, Kingsbury County, 2006-2015.

Year	***Number***	***Species***	***Size***
2007	2,000,000	Walleye	Fry
2008	2,400,000	Walleye	Fry
2010	2,350,000	Walleye	Fry
2012	1,200,000	Walleye	Fry
2013	1,161,000	Walleye	Fry
2014	1,161,000	Walleye	Fry
2015	1,200,000	Walleye	Fry
	48,900	Walleye	Fingerling

Methods

Lake Henry was sampled on August 12-13, 2015 with three overnight gill-net sets. The gill nets were 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting.

Results and Discussion

Net Catch Results

Yellow perch and walleye comprised a substantial portion (80%) of the gill net sample in 2015 (Table 5). Other game fish caught in the gill nets include black crappie, northern pike, and white bass. Rough fish abundance was very low.

Table 5. Total catch from three overnight gill nets set in Lake Henry, Kingsbury County, August 12-13, 2015.

Species	***#***	***%***	***CPUE[1]***	***80% C.I.***	***Mean CPUE****	***PSD***	***RSD-P***	***Mean Wr***
Yellow perch	147	51.6	49.0	±25.5	15.8	33	10	97
Walleye	81	28.4	27.0	±11.9	21.6	61	18	76
Black bullhead	18	6.3	6.0	±4.6	17.9	78	0	--
Common carp	17	6.0	5.7	±1.9	5.3	--	--	--
Black crappie	11	3.9	3.7	±2.8	2.2	--	--	--
Northern pike	9	3.2	3.0	±2.0	4.3	--	--	--
White bass	2	0.7	0.7	±0.9	0.2	--	--	--

*10 years (2006-2015)

Table 6. CPUE by length category for selected species sampled with gill nets in Lake Henry, Kingsbury County, August 12-13, 2015.

Species	***Substock***	***Stock***	***S-Q***	***Q-P***	***P+***	***All sizes***	***80% C.I.***
Yellow perch	25.0	24.0	16.0	5.7	2.3	49.0	±25.5
Walleye	6.7	20.3	8.0	8.7	3.7	27.0	±11.9
Black bullhead	--	6.0	1.3	4.7	--	6.0	±4.6
Common carp	5.0	0.7	--	0.3	0.3	5.7	±1.9
Black crappie	1.3	2.3	1.7	0.7	--	3.7	±2.8
Northern pike	--	3.0	1.3	0.3	1.3	3.0	±2.0
White bass	--	0.7	--	--	0.7	0.7	±0.9

Length categories can be found in Appendix A.

[1] See Appendix A for definitions of CPUE, PSD, RSD, RSD-P and mean Wr.

Table 7. Gill-net CPUE for selected fish species sampled in Lake Henry, Kingsbury County, 2006-2015.

Species	***2006***	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***	***2013***	***2014***	***2015***
Bigmouth Buffalo			--		--		--		0.3	--
Black Bullhead			0.7		0.3		75.0		7.3	6.0
Black Crappie			--		0.3		2.3		4.7	3.7
Common Carp			17.3		0.3		2.7		0.3	5.7
Northern Pike			2.3		3.3		8.0		4.7	3.0
Walleye			10.0		32.0		25.3		13.7	27.0
White Bass			--		--		--		0.3	0.7
White Sucker			0.3		--		--		--	--
Yellow Perch			0.7		3.7		12.7		13.0	49.0

Walleye

Management Objective

- maintain a walleye population with a total gill net CPUE of at least 15

Management Strategy

- stock walleye fry at the rate of 500/acre (1,849,500) as needed to achieve the management objective.

Walleye gill-net CPUE rose well above the management objective in 2015 (Table 8). The size distribution of the population was excellent (Figure 2), with a large number of fish over 38 cm (>15 in). The presence of substock-length (<25 cm, 10 in) fish suggests that stocking (Table 9) and/or natural reproduction has contributed to the population. There were reports of angling success noted in the spring of 2015, which should translate into increased opportunity in upcoming seasons.

Table 8. CPUE, PSD, RSD-P, and mean Wr for all walleye sampled with gill nets in Lake Henry, Kingsbury County, 2006-2015. Columns for stocked years are shaded.

	2006	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***	***2013***	***2014***	***2015***
CPUE			10.0		32.0		25.3		13.7	27.0
PSD			5		1		20		54	61
RSD-P			0		0		1		5	18
Mean Wr			89		86		79		87	76

Table 9. Walleye stocked into Lake Henry, Kingsbury County, 2006-2015.

Year	***Number***	***Size***
2007	2,000,000	Fry
2008	2,400,000	Fry
2010	2,350,000	Fry
2012	1,200,000	Fry
2014	1,160,000	Fry
2015	1,200,000	Fry
	48,900	Fingerling

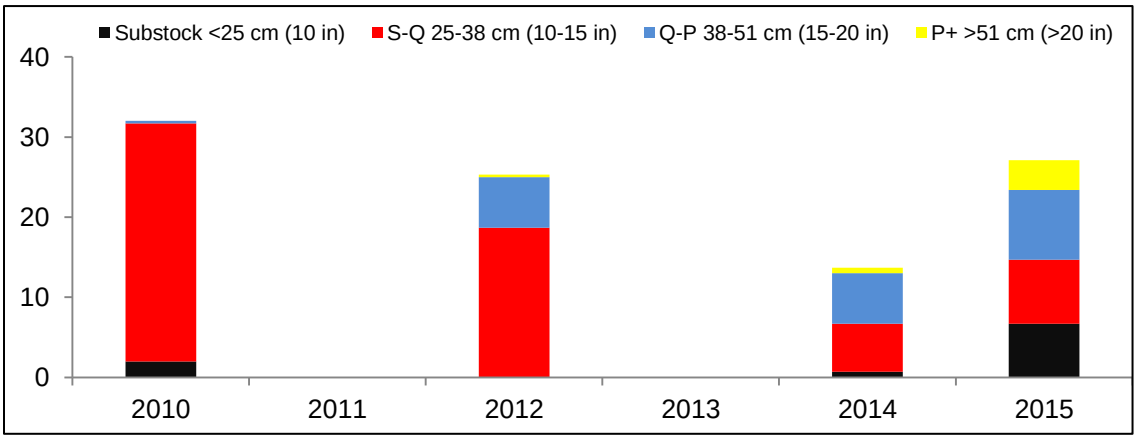

Figure 2. CPUE by length category for walleye sampled with gill nets in Lake Henry, Kingsbury County, 2010-2015.

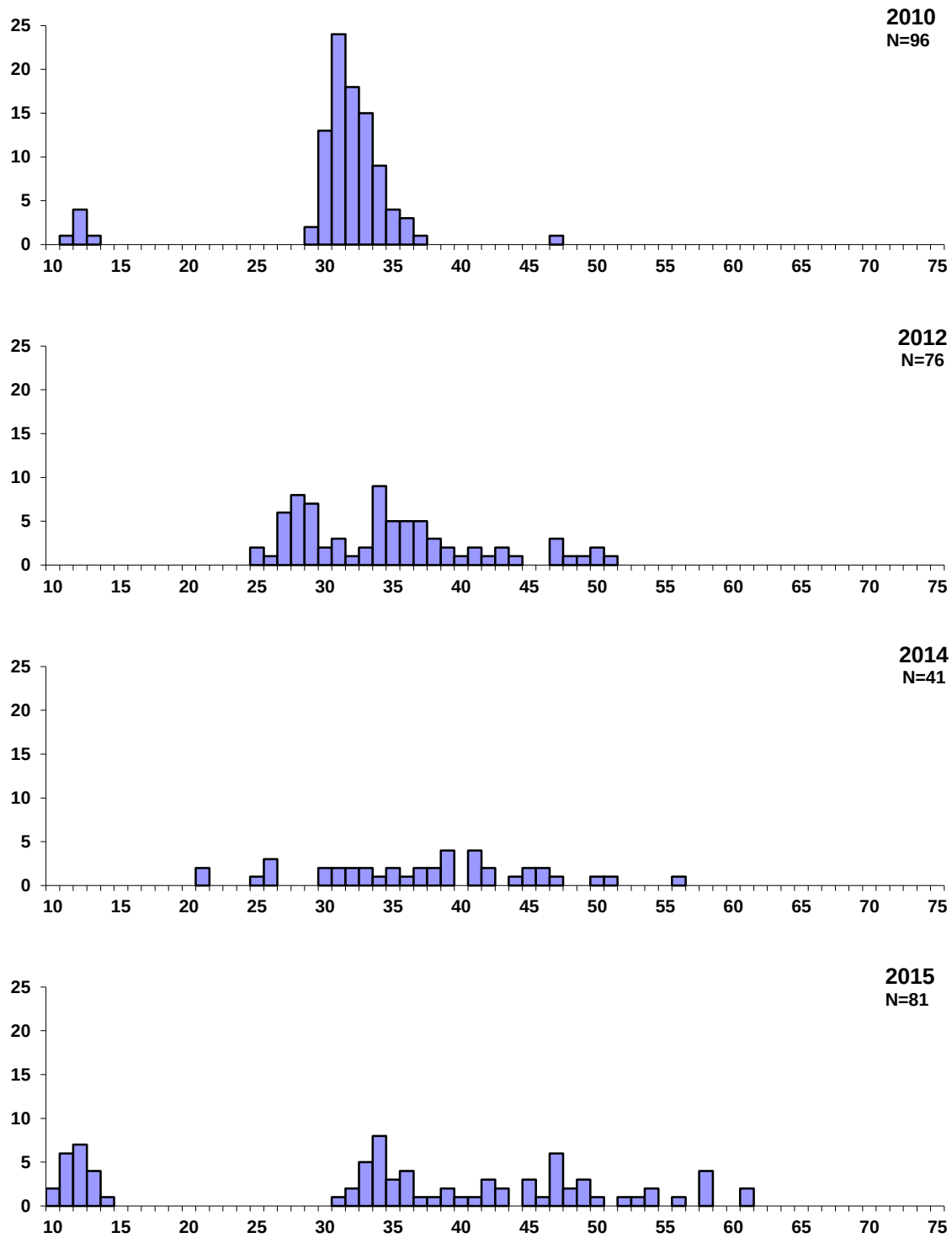

Figure 3. Length frequency histograms for walleyes sampled with gill nets in Lake Henry, Kingsbury County, 2010, 2012, 2014, 2015.

Yellow Perch

Yellow perch abundance is at a 10-year high on Lake Henry (Table 10). Over half of the fish sampled were substock (<13 cm, 5 in) length, indicating a strong, naturally-produced year class. Quality-length (20 cm, 8 in fish) and larger fish were also sampled and could provide some angling opportunity.

Table 10. CPUE, PSD, RSD-P, and mean Wr for all yellow perch sampled with gill nets in Lake Henry, Kingsbury County, 2006-2015. Columns for stocked years are shaded.

	2006	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***	***2013***	***2014***	***2015***
CPUE			0.7		3.7		12.7		13.0	49.0
PSD			--		20		42		36	33
RSD-P			--		20		37		23	10
Mean Wr			--		116		107		111	97

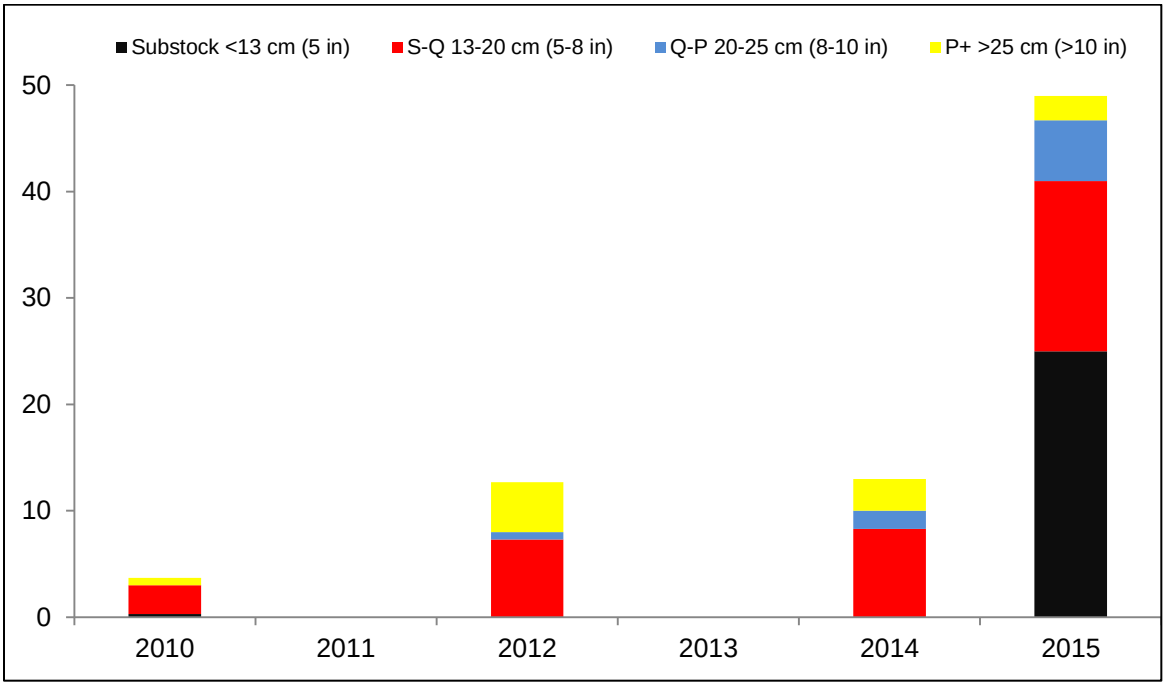

Figure 4. CPUE by length category for yellow perch sampled with gill nets in Lake Henry, Kingsbury County, 2010- 2015.

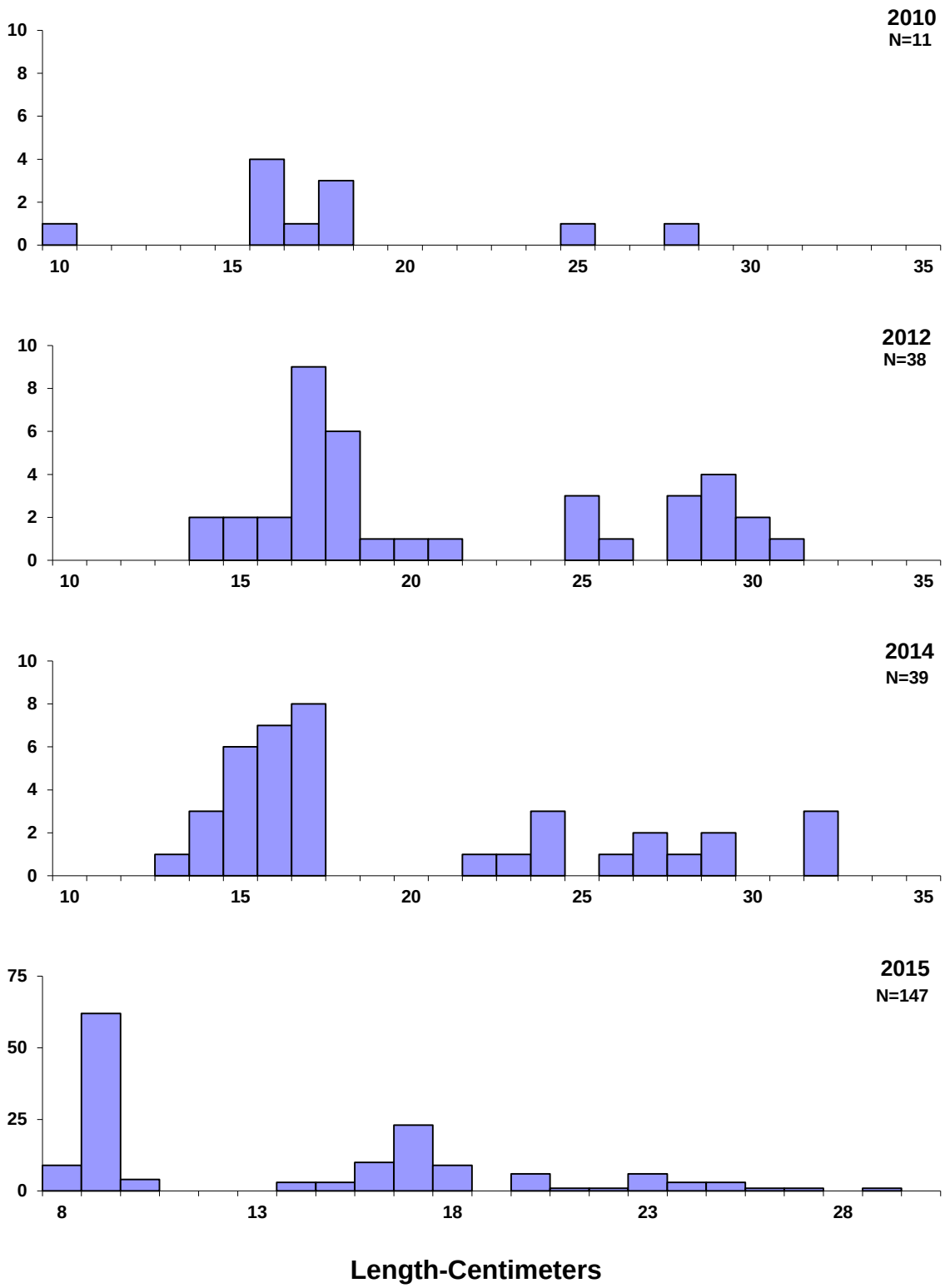

Figure 5. Length frequency histograms for yellow perch sampled with gill nets in Lake Henry, Kingsbury County, 2008, 2010, 2012, 2014, 2015.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters (Inches in parenthesis).

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Black crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
White crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Smallmouth bass	18 (7)	28 (11)	35(14)	43 (17)	51 (20)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Bigmouth buffalo	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.